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TECHNICAL SERIES NO. 12, PART IV. (Supplement to Technical Series No. 1.)

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ENTOMOLOGY.
L. O. HOWARD, Entomologist and Chief of Bureau.

MISCELLANEOUS PAPERS.

NEW GENERA AND SPECIES OF APHELININÆ,

WITH A

REVISED TABLE OF GENERA.

By L. O. HOWARD, PH. D.

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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Entomology,
Washington, D. C., April 9, 1907.

Sir: I have the honor to transmit the manuscript of a paper concerning certain important parasites of scale insects, which, on account of its technical character, I recommend for publication as Part IV of Technical Series No. 12 of this Bureau.

Respectfully,

L. O. Howard,
Entomologist and Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

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MISCELLANEOUS PAPERS.

NEW GENERA AND SPECIES OF APHELININÆ, WITH A REVISED TABLE OF GENERA.

By L. O. Howard, Ph. D.

INTRODUCTION.

Technical Series, No. 1, published in June, 1895, comprised a consideration of the Aphelininæ of North America, together with some mention of the insects of this group found in other parts of the world. In that publication the species of thirteen genera were considered, and twenty-six species were described. The economic importance of the group was pointed out and tables of host relations were printed. It was shown that economically these minute parasites are by far the most important of the parasites of the Diaspinæ, and in the twelve years that have elapsed since the publication of the bulletin their economic importance has become even more evident. It is claimed in California that the San Jose scale is held in subjection by these creatures, and in point of fact observations by Johnson and others in the East have shown that under certain conditions *Aphelinus fuscipennis* How. may multiply to such an extent as to produce a very high percentage of parasitism of this scale insect. Whether these parasites in the eastern United States will ever become as effective as in California, however, seems doubtful, on account of the longer breeding season on the Pacific coast, and as a matter of fact the opportunity to test the question does not exist, so universal and so effective has become the use of the lime-sulphur sprays in the eastern States.

In the twelve years since the publication of Technical Series, No. 1, many different species of Aphelininæ have been reared in one part of the world or another, and most of them have been referred to the writer for study. Very few, however, have been described; these are as follows:

Myiocnema (n. g.) pallida Ashmead. Canadian Entomologist, XXXII, No. 11, Nov., 1900, p. 349. Reared by A. Craw from *Saissetia oleæ* Bernard (*Lecanium oleæ*), collected by Geo. Compere, Brisbane, Queensland.

Aphelinus simplex Zehntner. Med. v. h. Proefst. Oost-Java, n. s., No. 36, 1897, pp. 19–20, Pl. I, figs. 18, 19. Reared by L. Zehntner, Java, from *Chionaspis sacchari-folii* Zehntner.

Encarsia planchoniæ Howard. Proc. U. S. Nat. Mus., XVIII, No. 1092, 1896, pp. 635–636. Reared by E. Ernest Green, Pundaloya, Ceylon, from *Asterolecanium delicatum* Green (*Planchonia delicata*).

Encarsia aonidiæ Howard. Ibid., p. 636. Reared by E. Ernest Green, Pundaloya, Ceylon, from *Aonidia corniger* Green.

Encarsia flaviclava Howard. Journ. Linn. Soc. Lond., XXV, 1894, No. 97. Collected on St. Vincent, B. W. I., by H. H. Smith.

Coccophagus orientalis Howard. Proc. U. S. Nat. Mus., XVIII, No. 1092, 1896, pp. 633–634. Reared by E. Ernest Green, Pundaloya, Ceylon, from *Ceroplastes actiniformis* Green, *Coccus viridis* Green (*Lecanium viride*), *Saissetia hemispharica* Targioni Tozzetti (*Lecanium coffeæ* Signoret), and *Pseudococcus longispinus* Targioni Tozzetti (*Dactylopius adonidum*).

Coccophagus flavescens Howard. Ibid., p. 634. Reared by E. E. Green, Pundaloya, Ceylon, from *Saissetia hemispharica* Targioni Tozzetti (*Lecanium coffeæ* Signoret).

Coccophagus fletcheri Howard. Bul. 7, n. s., Div. Ent., U. S. Dept. Agric., 1897, p. 63. Reared by J. Fletcher from *Eulecanium fletcheri* Cockerell, Ottawa, Canada.

Prospalta tristis Zehntner. Med. v. h. Proefst. Oost-Java, n. s., No. 29, 1896, pp. 11–12, pl., figs. 17–21. Reared by L. Zehntner from *Aleyrodes bergi* on sugar cane.

Prospalta berlesei Howard. Ent. News, XVII, No. 8, Oct., 1906, pp. 291–293. Reared by A. Berlese, Florence, Italy, from *Diaspis pentagona* Targioni Tozzetti, received from Washington, D. C., U. S. A.

Ablerus aureonotus Howard. Journ. Linn. Soc. Lond., XXVI, 1896, p. 157. Captured by H. H. Smith, Balthazar, Grenada, B. W. I.

Ablerus (Azotus) pulchriceps Zehntner. De plantenluizen van het suikerriet op Java, VIII, IX. (Med. v. h. Proefst. West-Java, No. 38, 1899, pp. 10–11, Pl. II, figs. 15–17.) Reared by L. Zehntner on *Aleyrodes* on sugar cane, Java. Belongs to *Azotus* Howard.

Physcus flavidus Zehntner. De plantenluizen van het suikerriet op Java. (Med. v. h. Proefst. West-Java, No. 37, 1898, pp. 5–7, pl., figs. 11–16.) Reared by L. Zehntner, Java, from *Chionaspis madiunensis* Zehntner.

Aneristus (n. g.) ceroplastæ Howard. Can. Ent., XXVII, No. 12, 1895, p. 351. Reared by T. D. A. Cockerell, Jamaica, B. W. I., from *Ceroplastes* sp. on *Euphorbia hypericifolia*.

Azotus (n. g.) marchali Howard. Proc. Ent. Soc. Wash., IV, No. 2, 1898, pp. 138–139. Reared by Paul Marchal, at Paris, France, from *Epidiaspis piricola* Del Guercio (*Diaspis ostreæformis* Signoret); and by W. M. Maskell from *Aspidiotus hederæ* Vallot (*Aspidiotus nerii* Bouché), Sidney, N. S. W.

Archenomus (n. g.) bicolor Howard. Ibid., pp. 137–138. Reared by Paul Marchal, Paris, France, from *Epidiaspis piricola* Del Guercio (*Diaspis ostreæformis* Signoret).

The present paper comprises a description of twenty new species and five new genera. Nearly all of these were received from other parts of the world, but some of them have no doubt already been established in this country. In fact, in looking over the material that has accumulated since the publication of Technical Series No. 1, it becomes obvious that the Aphelinine fauna of the United States, par-

ticularly of the eastern United States, has been undergoing a change. Species that were abundant eight or twelve years ago have become scarce, and introduced species have taken their places. It is indeed difficult to decide whether any of our Aphelininæ are natives of the United States. The introduction of plants from abroad, including very many different kinds of hothouse plants bearing scale insects, has resulted in the introduction not only of new scale insects, but of a number of species of scale-insect parasites. These parasites have undoubtedly in some instances attacked native scale insects and have increased in number. It seems very possible that *Coccophagus lecanii* Fitch and *Aphelinus mytilaspidis* Le Baron are native species. The same, too, is probably the case with *Eretmocerus corni* of Haldeman, but it seems probable that of the remaining species the great majority are of foreign origin.

In order to facilitate the recognition of genera, the descriptions of the new forms contained in this paper are prefaced by a catch table of genera. This table applies only to females. The males of many genera are not known, and as a rule females are reared in infinitely greater abundance than males, affording a strong suspicion that alternation of generations accompanied by parthenogenesis may hold with a number of the species. With the present paper and with Technical Series No. 1, and particularly where the observer has access to von Dalla Torre's catalogue, there should be no very great difficulty in recognizing described species and in deciding whether species reared have been described.

Subfamily APHELININÆ Howard.

Table of Tribes.

Tarsi 5-jointed [a]——Tribe I. *Aphelinini* Ashmead.
Tarsi 4-jointed——Tribe II. *Pteroptricini* Ashmead.

Tribe I. APHELININI.

Table of Genera

Females.

1. Fore wings with an obliquely transverse hairless line below stigma—— 2
   Fore wings without such an oblique hairless line—— 8
2. Antennæ 4-jointed—— 3
   Antennæ 6-jointed—— 4
   Antennæ 7-jointed—— 7
3. Scape long, slender; pedicel swollen; funicle joint very minute; club long and broad——*Marlattiella*, new genus.
4. Ovipositor exserted to from one-fifth to one-third length of abdomen—— 5
   Ovipositor not at all or but slightly exserted—— 6

[a] In the middle tarsi of *Encarsia luteola* and *E. quaintancei* the 2 terminal segments of the middle tarsi have coalesced, making them appear 4-jointed.

5. Notal sclerites normal, wings hyaline ..... *Centrodora* Foerster.
   Mesopostscutellum acutely triangular, fore wings with an irregular pattern of dark lines or spots ..... *Perissopterus* Howard.
6. Wings hyaline, or with a slight fuscous patch, eyes naked ..... *Aphelinus* Dalman
7. Antennal club 3-jointed, the 2 funicle joints longer than broad and subequal in length ..... *Mesidia* Foerster.
8. Antennæ 6-jointed 9
   Antennæ 7-jointed 10
   Antennæ 8-jointed 13
9. Antennæ with a scape, pedicel, 3 ring joints (funicle), and a moderately long club ..... *Thysanus* Haliday.
   (*Plastocharis* Foerster.)
10. Club 1-jointed; ovipositor extruded to one-half length of abdomen 11
    Club 2-jointed; ovipositor scarcely extruded 12
11. Stigmal vein squarely truncate at tip ..... *Ablerus* Howard.
    Stigmal vein with a swollen and rounded tip ..... *Azotus* Howard.
12. First funicle joint shorter than second and third ..... *Physcus* Howard.
13. Antennal club 2-jointed 14
    Antennal club 3-jointed 15
14. Hind tibiæ armed with very stiff black bristles ..... *Myiocnema* Ashmead.
    Hind tibiæ not so armed ..... *Encarsia* Foerster.
15. Stigmal vein lacking; wings with a very long fringe.
    Aspidiotiphagus Howard.
    Stigmal vein present; marginal cilia comparatively short 16
16. Marginal vein shorter than submarginal ..... *Prospalta* Howard.
    Marginal vein as long as or longer than submarginal 17
17. Antennal scape short, flagellum strongly flattened; hind tibiæ flattened and with a row of short bristles above ..... *Ancristus* Howard.
    Antennal scape not especially short, flagellum subcylindrical; hind tibiæ normal ..... *Coccophagus* Westwood.

Tribe II. PTEROPTRICINI.

Table of Genera.

Females.

1. Antennæ 5-jointed 2
   Antennæ with more than 5 joints 3
2. Funicle joints 1 and 2 ring joints ..... *Eretmocerus* Haldeman.
   Funicle joint 1 very short; joint 2 slender, four times as long as joint 1.
   Calcs, new genus.
3. Antennæ 7-jointed 4
   Antennæ 6-jointed 5
   Antennæ 8-jointed 6
4. Tarsal joints of middle leg short and subequal in length; middle tibial spur as long as first two tarsal joints together ..... *Casca*, new genus.
   First tarsal joint of middle leg as long as joints 2 and 3 together; middle tibial spur not quite as long as first tarsal joint ..... *Bardylis*, new genus.
5. Club of antenna 3-jointed, joints subequal in length; only one funicle joint.
   Artas, new genus.
   Club of antenna 2-jointed; wings spotted ..... *Marictta* Motschulsky.
6. Club 3-jointed; funicle joints 1 and 2 very short, 3 longer than 1 and 2 together and much wider than either ..... *Pteroptrix* Westwood.
   Club apparently 2-jointed; funicle joints 1 and 2 very short, 3 and 4 each longer than 1 and 2 together ..... *Archenomus* Howard.

Genus MARLATTIELLA, new genus.

Female.—Tarsi 5-jointed. Wings with an oblique hairless streak extending from stigma backward to near base of wing; the disc otherwise uniformly and rather densely ciliate; marginal vein much longer than submarginal; stigmal evident and plainly furnished with a rounded knob at tip; fore wing obtusely rounded at tip. Antennæ 4-jointed; scape inserted near mouth border, long, slender, reaching to top of head; pedicel considerably swollen, longer than broad; the single funicle joint very small, almost like a ring joint and rather oblique; club long and broad, rather blunt at apex, longer than scape, pedicel, and funicle together, and with sparse longitudinal striations. Axillæ of mesoscutum very narrow. Middle tarsi with first joint nearly as long as second and third together; middle tibial spur about as long as corresponding first tarsal joint. Hind tarsi longer than middle tarsi. Ovipositor somewhat extruded. Eyes hairy.

Male.—Unknown.

Type.—The following species:

Marlattiella prima, new species. (Fig. 13.)

Female.—Length 0.84 mm.; expanse 1.54 mm.; greatest width of fore wing 0.24 mm. General color dull orange-yellow; eyes reddish brown; ocelli carmine; closed mandibles dusky; all legs uniformly light yellow. Wings hyaline, veins faintly dusky.

FIG. 13.—*Marlattiella prima:* Antenna, fore wing, and middle leg of female. Greatly enlarged (original).

Male.—Unknown.

Type.—No. 10297, U. S. National Museum. Described from 10 female specimens bred from *Leucaspis japonica* Cockerell, collected by C. L. Marlatt, October 11, 1901, at Tientsin, China, on a "bush with variegated foliage," possibly a *Croton*.

Genus MESIDIA Foerster.

Mesidia Foerster, Hymenopterologische Studien, Heft II, 1856, p. 30.

This genus, hitherto known only through Foerster's brief characterization, is intermediate between *Aphelinus* and *Coccophagus*, hav-

ing the oblique hairless line on the fore wing, extending from stigma to near base of wing, of *Aphelinus* and having the three joints before the club of the antennæ of equal length, as with *Coccophagus*. Other female generic characters may be derived from the new species described below. The ovipositor is strong and well extruded. The femora are slightly swollen. The antennal club is ovate and flattened; funicle joints 1, 2, and 3 subequal in width and each somewhat shorter than the basal joint of the club; pedicel triangular, rather broader and longer than first funicle joint; club with sparse longitudinal striæ, as in *Coccophagus*. Eyes densely hairy, but with very

FIG. 14.—*Mesidia mexicana:* Female. Greatly enlarged (original).

short hairs. Marginal vein of fore wings as long as submarginal; stigmal obscure and almost lacking.

Type.—The following species:

Mesidia mexicana, new species. (Fig. 14.)

Female.—Length 0.68 mm.; expanse 1.4 mm.; greatest width of fore wing 0.24 mm. General color dark brown, nearly all of mesoscutellum except anterior border yellowish; all coxæ, femora, and antennæ brownish; tibiæ and tarsi whitish; wing veins dusky. All of mesonotum, except light portion of scutellum, finely and closely aciculate, as is also the mesoscutum.

Type.—No. 10298, U. S. National Museum. Described from 9 female specimens reared from an *Aleyrodes* collected on "Palo de Gusano" by C. H. T. Townsend at S. Francisco del Peal, Tabasco, Mexico, July 1, 1887.

Genus AZOTUS Howard.

Azotus Howard. Proc. Ent. Soc. Wash., Vol. IV, No. 2, 1898, pp. 138–139.

This interesting genus was described in the male sex only in the Proceedings of the Entomological Society of Washington, Vol. IV,

No. 2 (1898), pp. 138–139, the type species being *A. marchali* Howard reared by Dr. Paul Marchal at Paris from *Epidiaspis piricola* Del Guercio (*Diaspis ostreæformis* Signoret) and subsequently by W. M. Maskell from *Aspidiotus hederæ* Vallot (*Aspidiotus nerii* Bouché) received from Sydney, N. S. W.

Of the species described below a good series of females is before the writer and the following generic characterization of the female is therefore presented:

Female.—Ovipositor apparently normally extruded to from one-third to one-half the length of abdomen. Antennæ 7-jointed, there being no suture dividing the club into the two segments of which it is evidently homologically composed. (In the original description of the male antenna it was called 8-jointed, although no true suture

FIG. 15.—*Azotus capensis:* Female, and antenna of male. Greatly enlarged (original.)

occurs with the club in that sex.) Club nearly as long as last 3 funicle joints together; funicle joints 1, 2, and 4 nearly equal in length, 1 rather the shorter of the three; funicle joint 3 much shorter, although not so disproportionately short as in the male. All tarsi 5-jointed; joint 1 nearly as long as the others together; middle tibial spur about half as long as first tarsal joint. Marginal vein of fore wings not as long as submarginal; marginal cilia not especially long.

Azotus capensis, new species. (Fig. 15.)

Female.—Length 0.9 mm.; expanse 1.8 mm.; greatest width of fore wing 0.24 mm. General color black, with greenish metallic reflections on notum; antennæ brown, with base and tip of scape, tip of pedicel, and all of funicle joints 2 and 4 nearly white; all coxæ and femora brown, femora light at tips; trochanters white; front tibiæ

brown, light at tips; middle and hind tibiæ nearly white, with two brown bands; front tarsi light brown, terminal joint dark brown; middle and hind tarsi nearly white, the last joint brown. Eyes crimson. Marginal vein of fore wings brown; wings hyaline, with a transverse brown patch below marginal vein and another one nearer tip of wing; an oblique shade at point where submarginal vein turns upward to costa.

Male.—Length 0.6 mm.; expanse 1.8 mm.; greatest width of fore wing 0.24 mm. Antennæ uniformly light brown. Legs as in female, except that middle and hind tibiæ are uniformly brown, light at extremities, and that all tarsi are brownish. In the fore wings the brown shade below the marginal vein is present, but the outer brown shade is much fainter.

Type.—No. 10299, U. S. National Museum. Described from 12 male and 17 female specimens bred from an *Asterolecanium* on *Euryops tenuissimus*, Cape of Good Hope, South Africa, by C. P. Lounsbury, October, 1898.

NOTE.—*Eblerus pulchriceps* Zehntner (De Plantenluizen van het suikerriet op Java, VIII, IX, pp. 10, 11, Plaat ii, figs. 15, 16, 17), reared from *Aleyrodes longicornis* Zehntner in Java, belongs to this genus and greatly resembles this species, judging from Zehntner's well-drawn figures.

Genus **ENCARSIA** Foerster.

Encarsia Foerster. Kleine Monographien, 1878, pp. 65–66. (Type, *Encarsia tricolor* Foerster.)

TABLE OF SPECIES.

Females.

1. Tarsi of middle legs 4-jointed; joints 4 and 5 apparently coalesced 2
   Middle tarsi plainly 5-jointed 3
2. Pedicel and first funicle joint subequal in length ..... *luteola* Howard.
   First funicle joint shorter than pedicel and than second funicle joint. *quaintancei*, new species.
3. Club flattened ..... *flaviclava* Howard.
   Not flattened 4
4. First funicle joint swollen ..... *angelica* Howard.
   Not swollen 5
5. Pedicel and first funicle joint subequal in length 6
   Pedicel shorter than first funicle joint 8
   Pedicel longer than first funicle joint, which is distinctly shorter than second 10
6. Funicle joints 1 and 2 subequal in length; flagellar striations barely discernible 7
   Funicle joint 2 considerably longer than 1; striations close and distinct. *planchoniæ* Howard.
7. Fore wings with disc closely and completely ciliate *portoricensis*, new species.
   Fore wings with a round bare space below stigma *pergandiella*, new species.

8. All funicle joints subequal and concolorous 9
   Funicle joint 1 nearly as long as 2 and 3 together; the latter subequal and white; joint 1 and the club black ..... *diaspidis*, new species.
9. Terminal joint of club shorter than basal joint ..... *aonidiæ* Howard.
   Club joints equal in length ..... *coquillettii* Howard.
10. First funicle joint distinctly shorter than second ..... *townsendi*, new species.

Encarsia diaspidis, new species.

Female.—Length 1.6 mm.; expanse 3.6 mm.; greatest width of fore wing 0.5 mm. Eyes markedly hairy. Antennal scape robust; pedicel somewhat longer than broad; 1st funicle joint twice as long as pedicel; joints 2 and 3 much shorter and subequal in length and width; club rather slender and pointed, longer than funicle joints 2 and 3 together; all joints, including scape, plainly hairy. General color orange-yellow; antennæ black, joints 2 and 3 of funicle white; eyes reddish; dorsum of abdomen and metanotum infuscated, except for tip of abdomen, which is yellow; all legs uniform honey-yellow; wing veins yellowish.

Male.—The male *Encarsia* has not been described; but I have a slide from Lounsbury containing male specimens reared from the same host, in the same locality, and at the same time as the female described above, and these are probably the males of *E. diaspidis*. They are described as follows, generic characters included: Length 1.08 mm.; expanse 2.4 mm.; greatest width of fore wing 0.44 mm. Antennæ 8-jointed; scape not long, slightly swollen in middle; pedicel short, only as long as broad; 1st funicle joint long, 6 times as long as broad; funicle joints 2 and 3 subequal in length and width and each about one-half as long as joint 1; club 3-jointed, the segments as distinct as those of funicle; club joints 1 and 2 about equal in length to funicle joints 2 and 3; terminal joints shorter and rather obtusely pointed at tip; all flagellar joints strongly longitudinally striate. First joint of middle tarsus longest; middle tibial spur about as long as first tarsal joint. General color very dark brown, nearly black; antennæ uniformly dark brown; femora brown, hind femora darker than front and middle femora; trochanters light yellow; all tibiæ dusky, lighter at tips; tarsi yellowish, with their terminal joints brown.

Type.—No. 10300, U. S. National Museum. Described from 6 female and 6 male specimens, reared July, 1897, from a *Diaspis* on *Acacia horrida* at Bathurst, Cape Colony, South Africa, by C. P. Lounsbury.

This species is probably not a true *Encarsia*.

Encarsia portoricensis, new species.

Female.—Length 1 mm.; expanse 1.84 mm.; greatest width of fore wings 0.28 mm. Antennæ rather stout, with flagellum uniformly hairy, longitudinal striation only faintly discernible; scape uni-

formly slender; pedicel very slightly longer than broad; 1st funicle joint about as long as pedicel; joint 2 very slightly longer than 1 and about equal to joints 3 and 4 and each of the two club joints. Submarginal and marginal veins about equal in length, stigmal very short and entering the wing at a small angle. Middle tarsi and tibial spur as with the preceding species. General color lemon-yellow; ocelli dark crimson, eyes very dark crimson; antennæ and legs dusky; abdomen with a brownish dorsal central patch. The specimen from Porto Rico has the abdomen entirely brown above and the pronotum and anterior portion of mesoscutum brownish.

Male.—Unknown.

Type.—No. 10301, U. S. National Museum. Described from 3 female specimens reared January, 1899, by Mr. A. Busck from *Aleyrodes* sp. on a climbing vine, Bayamon, Porto Rico (Bur. Entom. No. 8423°) and 1 female specimen received March, 1907, from Mr. E. K. Carnes of the California Board of Horticultural Commissioners, labeled "on *Aleyrodes* sp. Mexico."

Encarsia pergandiella, new species.

Female.—Length 0.58 mm.; expanse 1.46 mm.; greatest width of fore wing 0.14 mm. Antennæ long, slender, and faintly hairy; pedicel and first funicle joint subequal in length; remaining funicle joints increasing gradually in length; basal joint of club slightly longer than terminal joint and the preceding funicle joint. Ovipositor slightly extruded. First tarsal joint of middle legs long and slender, nearly as long as the remaining 4 joints together; middle tibial spur about one-half length of 1st tarsal joint. Front wings rather narrow, with a considerably longer fringe than usual; discal cilia rather sparse, and a round perfectly hairless spur below stigma. General color uniform honey-yellow; eyes and ocelli red.

Male.—Unknown.

Type.—No. 10302, U. S. National Museum. Described from 7 female specimens reared by Mr. Theo. Pergande from an Aleyrodes on *Xanthium strumarium*, Washington, D. C., September 25, 1900 (Bur. Entom. No. 9321°). Also reared by Mr. Pergande at Washington, D. C., November 20, 1894, from an *Aleyrodes* on blackberry (Bur. Ent., No. 6452).

Encarsia townsendi, new species.

Female.—Length 0.66 mm.; expanse 1.56 mm.; greatest width of fore wing 0.22 mm. Antennæ with numerous hairs, but with very faint striation; scape not especially long; pedicel longer than wide; first funicle joint about as long as wide, shorter than pedicel and only one-half as long as second funicle joint; second and remaining funicle joints subequal in length and width, as is also basal joint of club (terminal joint of club missing on all specimens).

Middle tarsi with joint 1 as long as 2 and 3 together; middle tibial spur as long as joint 1. Ovipositor considerably extended. Face and vertex orange-yellow; ocelli carmine; eyes dark red; mesoscutellum dull lemon-yellow; remainder of notum and dorsum of abdomen light brown; tip of abdomen yellowish; antennæ dusky; legs and antennal veins dusky; fore wings with a faint dusky shade below marginal vein.

Male.—Unknown.

Type.—No. 10303, U. S. National Museum. Described from 5 female specimens reared June 19, 1897, from an *Aleyrodes* on a coarse grass taken at Sangrillo del Chico, Tabasco, Mex. (Bur. Ent., No. 741), by C. H. T. Townsend.

Encarsia quaintancei, new species.

Female.—Length 0.66 mm.; expanse 1.4 mm.; greatest width of fore wing 0.18 mm. Middle tarsi 4-jointed as with *luteola*, the fourth and fifth segments apparently coalesced. Pedicel of antennæ twice as long as broad; joint 1 of funicle somewhat longer than broad, shorter than pedicel and shorter than second funicle joint; second, third, and fourth funicle joints increasing gradually in length; club joints subequal in length. Fore wings with a small rounded hairless space below and beyond stigma, not extending to one-half the wing breadth. Eyes hairy. Mesoscutum delicately hexagonally reticulated; axillæ delicately reticulate. General color brown; mesoscutellum wholly lemon-yellow; tips of abdomen and flagellum of antennæ yellowish; all legs faintly yellowish; wings hyaline.

Male.—Unknown.

Type.—No. 10304, U. S. National Museum. Described from 1 female specimen reared August 29, 1900, by Theo. Pergande from *Aleyrodes* sp. on *Polygonum*, Bladensburg road, D. C.

The species is named for Prof. A. L. Quaintance in recognition of his excellent work on the Aleyrodidæ.

Genus PROSPALTA Howard.

Prospalta Howard. Insect Life, Vol. VII, 1894, p. 6. (Type, *Prospalta aurantii* Howard.)

Prospalta maculata, new species. (Fig. 16.)

Female.—Length 1 mm.; expanse 2.24 mm.; greatest width of fore wing 0.31 mm. Comes rather close to *P. murtfeldtii* How., but the antennæ are not so strongly clubbed. The color is as follows: Antennal club brown, whitest at tip; scape and funicle joints 2 and 3 whitish; general color of body and legs light yellow; middle and hind tibiæ each with two brown bands; first tarsal joint of middle and hind legs brown; first, fourth, fifth, and sixth abdominal seg-

ments with a complete brown cross-band: second and third with a brown cross-band interrupted in the middle. Mesoscutum with two longitudinal brown bands; axillæ brown; mesoscutellum with two large brown spots. Wings hyaline.

FIG. 16.—*Prospalta maculata:* Female. Greatly enlarged (original).

Type.—No. 10305, U. S. National Museum. Described from 1 female specimen bred by Mr. E. K. Carnes from *Lepidosaphes beckii* Newman (*Mytilaspis citricola* Glover), sent to California from China by Mr. George Compere.

Genus COCCOPHAGUS Westwood.

Coccophagus Westwood. Philosoph. Mag., Vol. III, 1833. (Type, (*Entedon*) *scutellaris* Dalman.)

Coccophagus subochraceus, new species.

Female.—Length 1.1 mm.; expanse 2.6 mm.; greatest width of fore wing 0.48 mm. Differs from *C. ochraceus* in having the entire body, including the mesopleura and the terminal segments of the abdomen, ochraceous.

Male.—Differs from *C. ochraceus* in having the axillæ and the entire dorsal surface of the abdomen black and the metanotum dusky.

Type.—No. 10306, U. S. National Museum. Described from 5 female and 25 male specimens bred from a *Lecanium* on *Leucospermum attenuatum*, at Zuurberg, Cape Colony, South Africa, by C. P. Lounsbury, 1897.

Coccophagus longifasciatus, new species. (Fig. 17.)

Female.—Length 0.78 mm.; expanse 1.56 mm.; greatest width of fore wing 0.26 mm. Antennæ stout, moderately clavate, with plain

longitudinal striæ. Surface of body smooth, impunctate. General color of body light lemon-yellow; eyes and ocelli bright carmine; all legs pallid; antennæ and wing veins slightly dusky; a broad lateral brown band extending down either side of the body from the pronotum to the tip of the abdomen.

Male.—In the male the brown band is not so perfect, but the pronotum, the anterior border of the mesoscutum, the axillæ, all of the metanotum, and the sides and tip of the abdomen are brown.

Type.—No. 10307, U. S. National Museum. Described from 4

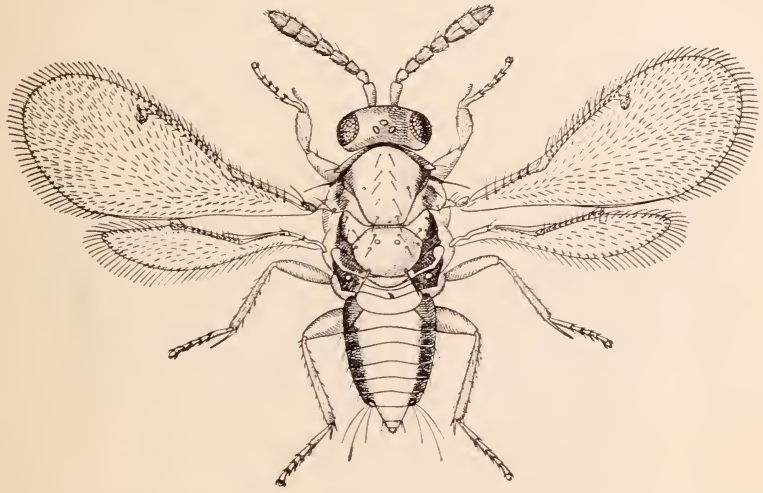

FIG. 17.—*Coccophagus longifasciatus:* Female. Greatly enlarged (original).

male and 4 female specimens bred from *Saissetia nigra* Nietner (*Lecanium nigrum*), at Manaar, Ceylon, by E. Ernest Green, 1897.

Coccophagus zebratus, new species. (Fig. 18.)

Female.—Length 1.34 mm.; expanse 2.4 mm.; greatest width of fore wing 0.32 mm. Body smooth, flat, impunctate; antennæ with only very slight indications of longitudinal striæ; hind femora and coxæ considerably swollen. Club of antennæ dark brown; scape, pedicel, and funicle joints 1 and 2 of a rather lighter brown; funicle joint 3 white. Vertex, occiput, pronotum, and mesonotum lemon-yellow, metascutum brown; face and remainder of thorax whitish; all femora and coxæ whitish and front tibiæ as well; middle and hind tibiæ slightly brownish at base; first joint of middle and hind tarsi brown. Abdomen whitish, with a broad brown transverse band on each segment. Wing veins dusky.

Male.—Unknown.

Type.—No. 10308, U. S. National Museum. Two female specimens bred from *Aclerda distorta* Green, MS., Punduloya, Ceylon, by E. Ernest Green.

Genus CALES, new genus.

Female.—Tarsi 4-jointed; first and last joints of middle tarsus much longer than second and third; middle tibial spur not as long as first tarsal joint; joints of hind tarsus subequal in length. Antennæ 5-jointed; bulla very long and slender, scape somewhat swollen; pedicel not greatly swollen, nearly three times as long as broad; funicle joint 1 short and slender, about as long as broad (this joint may possibly be found to be double on examination of additional specimens). Second funicle joint slender, more than four times as long as joint 1; club ovate, undivided, and longer than funicle and pedicel together. Eyes naked. Fore wings narrow, with subparallel fore and hind borders; marginal cilia long; discal cilia very sparse and placed in two long horizontal rows and part of a third; marginal

FIG. 18.—*Coccophagus zebratus:* Female. Greatly enlarged (original).

vein somewhat longer than submarginal; no differentiated stigmal. Ovipositor slightly extruded.

Male.—Unknown.

Type.—The following species:

Cales noacki, new species. (Fig. 19.)

Female.—Length 0.52; expanse 1.44 mm.; greatest width of fore wing 0.12 mm. General color lemon-yellow; eyes reddish brown; antennæ uniformly yellow; legs slightly dusky. Legs long and slender; body rather slender and graceful; abdomen rather short and triangular. Wings hyaline, veins dusky.

Type.—No. 10309, U. S. National Museum. Described from one female specimen reared by Fritz Noack, Campinas, Brazil, from an undetermined species of *Orthezia*. (Bureau of Entomology No. 818301.)

Genus CASCA, new genus.

Female.—Comes rather close to *Bardylis*, from which, however, it may be easily separated by tarsal, antennal, and wing characters. All tarsi 4-jointed, the tarsal joints of middle leg all short and subequal in length; apical spur of middle tibia as long as first two tarsal joints together; hind tarsi longer than middle tarsi, but the joints are subequal in length as with the middle. Marginal vein of fore wing rather shorter than submarginal; stigmal evident; disk uniformly ciliate, but more sparsely than with *Bardylis;* hind border of wing slightly excavate beyond anal angle, tip regularly rounded; marginal cilia long, longest at lower wing tip. Antennæ 7-jointed, somewhat clavate, the club rather long and but slightly swollen, tapering to a point and with the joints subequal in length; second funicle joint shorter than first, but of same width and only slightly longer than wide, much shorter and narrower than first club joint; first funicle joint about twice as long as wide, as long as, but narrower than pedicel. Flagellum hairy and club with longitudinal striæ. Eyes hairy.

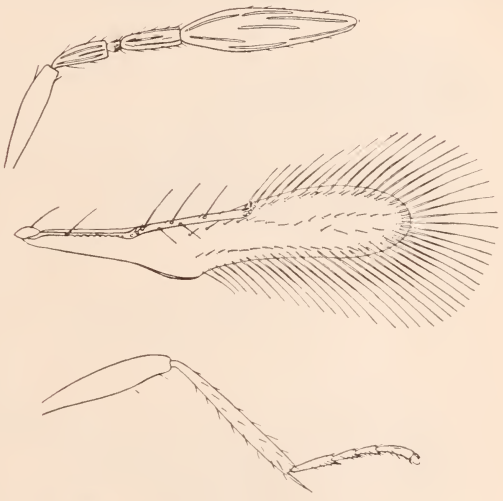

FIG. 19.—*Cales noacki:* Antenna, fore wing, and middle leg of female. Greatly enlarged (original).

Male.—Unknown.

Type.—The following species:

Casca chinensis, new species. (Fig. 20.)

Female.—Length 0.86 mm.; expanse 1.34 mm.; greatest width of fore wing 0.16 mm. Head and face orange-yellow, occiput dusky; ocelli and eyes carmine, the eyes darker than the ocelli; antennæ light dusky yellow; all legs pallid; pronotum, abdomen, and metascutum brown; mesoscutum also brownish at anterior border; remainder of mesoscutum yellowish and remainder of mesonotum and mesopleura pallid. Fore wing with a pronounced dusky cloud below marginal vein.

Male.—Unknown.

Type.—No. 10310. U. S. National Museum. Described from 2 female specimens reared in California by Mr. E. K. Carnes from

Lepidosaphes beckii Newman (*Mytilaspis citricola* Glover) collected in China by Mr. George Compere.

Genus BARDYLIS, new genus.

Female.—All tarsi 4-jointed; first tarsal joint of middle leg nearly as long as second and third joints together; middle tibial spur not quite as long as first tarsal joint. Marginal vein of fore wing a trifle shorter than submarginal; stigmal short but evident; wing disc very closely and evenly ciliate; margin with long cilia from stigma to anal angle, gradually lengthening from stigma to lower distal point and thence rapidly decreasing in length to anal angle; margin of wing evenly curved from anal angle to costa. Antennæ 7-jointed, pronouncedly clavate; club ovate, with its joints of subequal length; the two funicle joints about equal in length and width, each slightly shorter than pedicel and first club joint; the whole surface of the flagellum furnished with minute hairs. Eyes hairy.

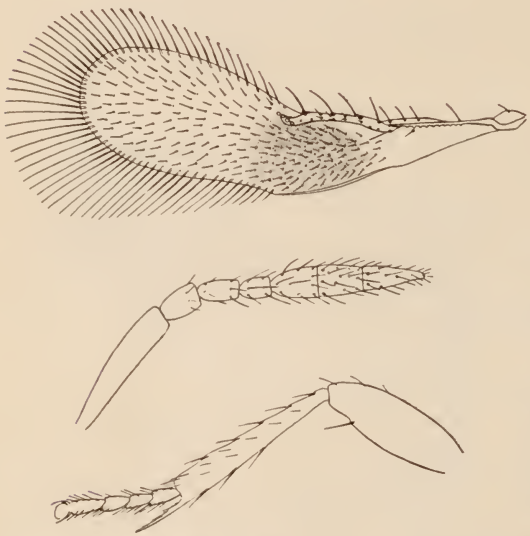

FIG. 20.—*Casca chinensis:* Fore wing, antenna, and middle leg of female. Greatly enlarged (original).

Male.—Antennæ more elongate, 8-jointed, all scape joints subequal in length and width, except terminal joint of club, which comes to a rounded point. The tarsi are longer than in the female and the first funicle joint is not as long as the second and third together.

Type.—The following species:

Bardylis australiensis, new species. (Fig. 21.)

Female.—Length 0.5 mm.; expanse 1.34 mm.; greatest width of fore wing 0.18 mm. Color: Head, pronotum, mesoscutum, tegulæ, and abdomen brown; mesoscutellum, metascutum, mesopleura, and metapleura dull orange-yellow; antennæ, coxæ, and femora light brown; wing veins dusky; fore wings with a dusky cloud below marginal vein; eyes dark red. Occiput closely and finely aciculate; mesoscutum faintly aciculate.

Male.—Differs from female only as pointed out in generic diagnosis, except that the clouded portion of the fore wing is lighter than in the female.

Type.—No. 10311, U. S. National Museum. Described from many male and female specimens reared by Mr. Geo. Compere, evidently from scale insects, at Swan River and Perth, West Australia. (Compere's numbers 774, 855, 871, 873, 923, 925, 944, and 1026.)

Also from a number of specimens reared by A. Koebele, September 29, 1899, from an *Aspidiotus* on *Hakea* sp., at Sydney, New South Wales. (Koebele's No. 1998.)

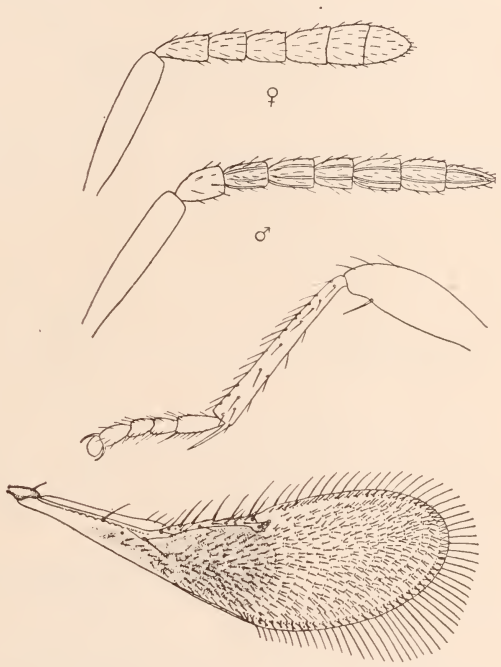

FIG. 21.—*Bardylis australiensis:* Antenna of female, and antenna, hind leg, and fore wing of male. Greatly enlarged (original).

Genus ARTAS, new genus.

Female.—Tarsi 4-jointed; antennæ 6-jointed; scape and pedicel normal, the single funicle joint about as long as the first club joint and slightly more slender; club joints subequal in length, the terminal joint tapering to a point. Fore wings very obtusely rounded and almost bare, having very few discal cilia; four long hairs arising from marginal vein, and a series of very long marginal hairs beginning at the tip of the marginal vein and extending around to the middle of the lower margin, slightly longer at lower tip; marginal vein equal in length to submarginal; stigmal lacking as in *Aspidiotiphagus.* Tarsal joints of middle tarsi subequal in length, tibial spur longer than the first two tarsal joints together.

Male.—Unknown.

Type.—The following species:

Artas koebelei, new species. (Fig. 22.)

Female.—Length 0.38 mm.; expanse 1 mm.; greatest width of fore wing 0.13 mm. General color dull yellow; mesoscutellum light

lemon-yellow: eyes and ocelli dark red; wing veins dusky; pronotum, front of mesoscutum, axillæ, and sides of metanotum dark brown; dorsum of abdomen dusky.

Male.—Unknown.

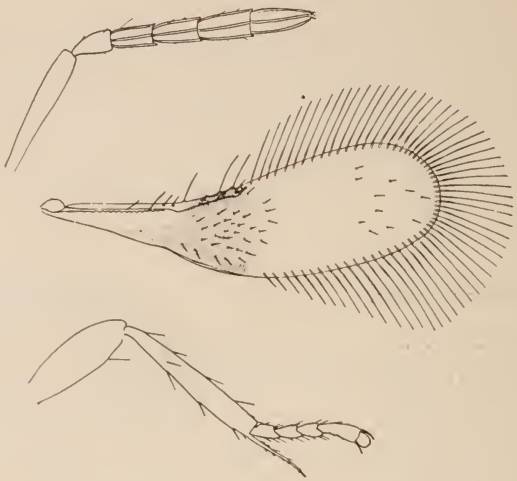

FIG. 22.—*Artas koebelei:* Antenna, fore wing, and hind leg of female. Greatly enlarged (original).

Type.—No. 10312, U. S. National Museum. Described from 11 male specimens reared from *Chionaspis vitis* Green, Hongkong, China, by A. Koebele.

Genus PERISSOPTERUS Howard.

Perissopterus Howard. Tech. Ser. 1, Div. Ent., U. S. Dept. Agric., 1895, pp. 20–21. (Type, *P. pulchellus* Howard.)

Male.—In the original description of this genus[a] the male is not described, the description of the male *P. pulchellus* having been made from a dry mount with shriveled antennæ. The important fact has since been discovered that with the male of *Perissopterus* the antennæ are only 5-jointed, viz, scape, pedicel, 2 ring joints, and club; the club being long, oval, and more or less flattened. With *P. pulchellus* the male in other respects resembles the female.

TABLE OF SPECIES.

1. Eyes hairy 2
   Eyes naked 3
2. Antennal club black ..... *noumeensis*, new species.
   Antennal club pallid ..... *capillatus*, new species.

[a] Tech. Ser., No. 1, Div. Ent., U. S. Dept. Agric., pp. 21–22.

3. First four tarsal joints of middle leg white, including tibial coronet of spines_____*busckii*, new species.
Not white, tibial coronet black_____ 4
4. First and fifth tarsal joints black, rest white_____*javensis*, new species.
First and fifth and at least part of the second tarsal joint black_____ 5
5. General color white, tinged in spots with dark reddish orange, dotted with black_____*pulchellus* Howard.
General color light orange-yellow, with black dots (no red or white).
mexicanus Howard.

Perissopterus capillatus, new species.

Female.—Length 1 mm.; expanse 2.16 mm.; greatest width of fore wing 0.36. Eyes closely and plainly hairy. Eyes well separated; ocelli at angles of obtuse-angled triangle. Vertex and occiput faintly reticulate, thorax smooth. The fore wings appear spotted with patches of dark cilia, the spots not connected in a reticulate pattern as with *P. pulchellus* and *P. mexicanus*. Head uniform orange-yellow, eyes red; mesonotum lemon-yellow, metanotum darker; abdomen marked with alternating transverse bands of light yellow and honey-yellow; antennæ light yellowish; legs very light in color, femora dusky at tip; middle and hind tibiæ dusky at tips and with two other dusky spots on bands; first and fifth tarsal joints dusky.

Male.—Unknown.

Type.—No. 10313, U. S. National Museum. Described from 11 female specimens reared by Mr. Koebele from *Lepidosaphes pallens* Maskell (*Mytilaspis pallens*) on *Xanthorrhœa*, Sydney, New South Wales, December 20, 1895.

Perissopterus noumeænsis, new species.

Female.—Length 0.86 mm.; expanse 1.9 mm.; greatest width of fore wing 0.3 mm. Eyes with numerous fine black hairs. General color dingy yellowish white; antennal club dark brown, nearly black; scape, pedicel, and funicle lighter; lower face orange; sides of mesoscutum with a thin line of brown; abdomen with alternating dark brown and whitish bands; femora slightly brownish above, tibiæ brownish at tips; middle tarsi entirely brownish yellow; hind tarsi with first joint pallid, rest yellowish.

Type.—No. 10314, U. S. National Museum. Described from one female specimen, bred October, 1899, from *Aspidiotus* sp. on cocoa palm, Noumea, New Caledonia, by A. Koebele.

Perissopterus busckii, new species.

Male.—Length 0.76 mm.; expanse 1.7 mm.; greatest width of fore wing 0.3 mm. Eyes naked. Markings of fore wings reticulate, not arranged in spots. General color uniform orange-yellow; antennal club brownish, lighter at tip; scape whitish, pedicel dark above, light below; metascutellum darker at sides; legs pallid; all femora with two dark spots below; tibiæ with four equidistant brown spots

on bands; terminal tarsal joints dusky; basal tarsal joint of hind leg also dusky.

Female.—Unknown.

Type.—No. 10315, U. S. National Museum. Described from one male reared from *Asterolecanium aureum* Boisduval, collected at San Juan, Porto Rico, February 21, 1899, by A. Busck.

Perissopterus javensis, new species.

Female.—Length 0.72 mm.; expanse 2.2 mm.; greatest width of fore wing 0.28 mm. Eyes naked. Pattern of fore wings of the reticulate type. Ovipositor well extruded. Mesoscutum and mesoscutellum delicately hexagonally reticulate-punctate. General color orange, sides of thorax and abdomen marked with whitish; abdomen with more or less perfect cross-bands of brownish. Legs pallid; femora with two narrow bands of brown; tibiæ with three broad brown bands, broader on middle than on hind tibia, and with a narrow brown tip; first and fifth tarsal joints brownish, others pallid. Antennæ with club brown, yellowish at tip; third funicle joint brown, white at tip; first and second funicle joints (ring joints) brown; pedicel brown at base, white at tip.

Male.—Smaller. Color about as with female, but with small white thorax. Entire club brown except somewhat lighter at tip; pedicel whitish at tip.

Type.—No. 10316, U. S. National Museum. Described from 7 male and 8 female specimens reared February, 1900, from a species of *Tachardia* on an ornamental plant at Singapore, Straits Settlements, by A. Koebele (Koebele's No. 2005).

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